REMARKS

Claims 1-24 are pending in this application. All claims have been rejected. These rejections are respectfully traversed and reconsideration is requested.

Allowable Subject Matter

The Applicants note with appreciation the indication of allowability of Claims 16-19.

Claim Rejections Under 35 U.S.C. 101

Claims 1-10 and 22 have been rejected under 35 U.S.C. § 101 because the claimed invention was directed to an abstract method. Claims 1 and 22 have been amended to specify that the method is performed in a computer, thus making it concrete and tangible, and overcoming the rejection.

Double Patenting

Claims 11-20, 21 and 23 have been rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claim 1 of U.S. Patent No. 6,654,649. This rejection is respectfully traversed and reconsideration is requested.

The present application is directed toward creating a non-linear empirical model that has a constrained global behavior. The constrained behavior of the model derivative is guaranteed across the entire input domain of the model. The constrained model is created in three stages, including creating an initial model through specifying the general shape of the gain trajectory, then constructing a non-linear network model based on the initial model, and finally constraining parameters of the non-linear model based on empirical inputs to produce the constrained model. (Specification, p. 5, ll. 4-9). The resulting constrained model may be used to model any form of an empirical process to produce a constrained non-linear approximator. For example, the constrained model may be used for stock market simulations, chemical process control, etc.

Treiber (U.S. Patent No. 6,654,649) is directed toward using a first principles, steady state model of a desired polymer process with a non-linear optimizer in a linear chemical process controller. Claim 1 of Treiber is specifically directed to a computer apparatus for controlling a non-linear manufacturing process. The controller controlling the manufacturing process employs

a non-linear model of the subject process, as recited in line 16 of Claim 1. The non-linear model employed may be initially created using, for example, an apparatus as claimed in Claim 11 in the present invention, but it need not be so. That is, Claim 1 of Treiber recites using a model as one of the elements in a particular application, while Claim 11 of the present application addresses how to build a specific type of a model – a globally constrained non-linear empirical model. Therefore, it would not have been obvious to one of skill at the art at the time of the invention how to build a globally constrained non-linear model based on the teachings and claimed subject matter of Treiber, and Claims 11-20, 21 and 23 are not obvious in view of Treiber.

Claims 1-10 and 22 have been rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claim 8 of U.S. Patent No. 6,654,649. This rejection is respectfully traversed and reconsideration is requested.

As discussed above, the globally constrained non-linear model of the present invention may be used in a number of applications, not just in controlling a manufacturing process as in Claim 8 of Treiber, and there is no suggestion in the specification or claims of Treiber as to how to build a globally constrained non-linear empirical model. Therefore, it would not be obvious to one of skill in the art at the time of the invention to build a non-linear model through the three-stage process described in the present application and claimed in Claim 1, and the rejection should be withdrawn.

Claim Rejections Under 35 U.S.C. 102

Claims 1, 11, and 21-24 have been rejected under 35 U.S.C. §102(b) as being anticipated by Wassick (U.S. Patent No. 5,740,033). This rejection is respectfully traversed and reconsideration is requested.

Wassick is directed toward a model predictive controller for a process control system. A process model of Wassick represents the dynamic behavior of a physical process. An interactive modeler is used to solve a set of equations as to how the physical process will react to control changes in order to determine an optimized set of control changes. (Abstract).

Nowhere does Wassick teach or suggest calibrating a non-linear network model based on empirical inputs by constraining parameters of the model to produce a constrained model with global behavior, as is recited, for example, in independent Claims 1, 11, and 21-24. Wassick is

not concerned with building a globally constrained empirical model, but with computing process responses over a prediction horizon using constraint equations. (Col. 10, ll. 35-36) Furthermore, by reciting the use of equations representing physical process constraints, Wassick specifically teaches away from constraining a non-linear model using empirical inputs, teaching, instead, to use physical, or first-principles, model for constraining and calibration. (Col. 11, ll. 50-55). Therefore, independent Claims 1, 11, and 21-24 are not anticipated by Wassick and the rejection should be withdrawn

Claims 1-5, 10-15 and 20-24 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Treiber (U.S. Patent No. 6,654,649). This rejection is respectfully traversed and reconsideration is requested.

Treiber does not teach or suggest building a globally constrained empirical non-linear model as is recited at least in amended independent Claims 1, 11, and 21-24. As discussed above, Treiber merely illustrates one of the applications in which such a model may be used, without specifying how to construct it.

Treiber teaches how to control a chemical manufacturing process. The controller in the manufacturing process typically employs a model, which can be, for example, the globally constrained non-linear empirical model of the present invention, but it needs not be. The similarity of language and the terms "model" and "constrained model" does not mean the similarity of the teachings of Treiber and the present application. Claims 1, 11 and 21-24 have been amended to further clarify the scope of the present invention. The calibrating of the model of the present invention is used to calibrate the non-linear model structure, unlike in Treiber and other process controllers, where model optimization is used to determine an optimal operating point or a set of controller moves to get to that operating point, while the model itself is treated as a "black box" and is not constrained or optimized during the manufacturing process. Therefore, Treiber does not anticipate independent Claims 1, 11 and 21-24. Dependent Claims 4-5, 10 and 12-15 depend on independent Claims 1 and 11, respectively and are not anticipated by Treiber for at least the same reasons as above. All claims are now believed to be in condition for allowance.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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